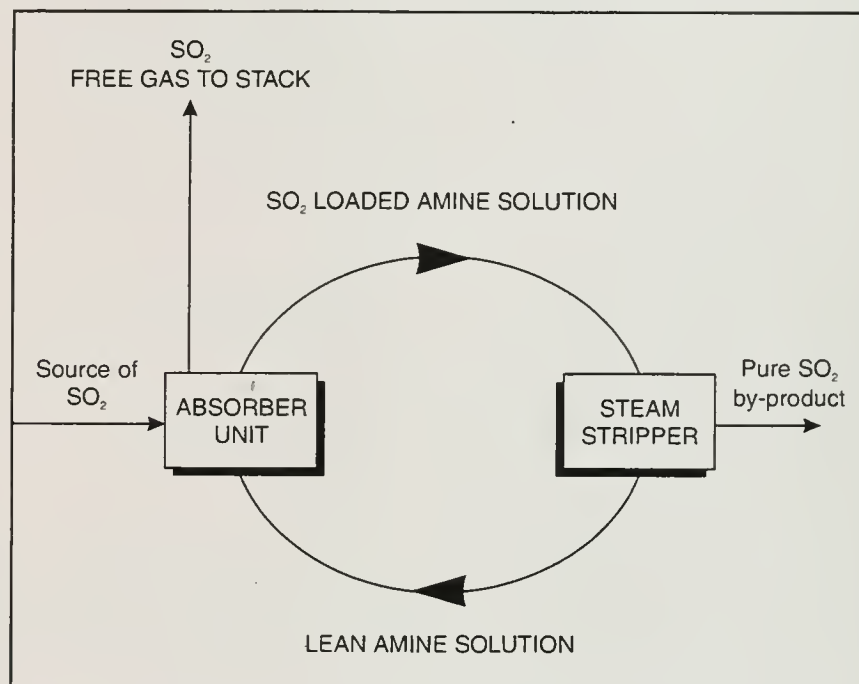


Turbotak FGD Scrubber Products

"At Turbotak, we feel the throw-away mentality is on the way out, especially when pollutants can become valuable commercial products. The use of regenerable processes to control both FGD and VOC emissions is a key element in Turbotak's long-range plan. Down the road, we will apply our FGD regenerable technology to applications on large coal-burning utility emissions. In the immediate future, our targets include sulphuric acid plant tail-gas and base metal smelter emissions, where the pure SO₂ that is recovered can be introduced into existing acid plants. There are already many applications such as this that we can learn from. These by demonstration, should lead to applications in the traditionally conservative utility industry."

Dr. Donald Spink,
President, Turbotak Technologies Inc.,
Waterloo, Ontario



The Turbotak FGD Scrubber Process

THE COMPANY

Turbotak Technologies Inc., has developed and markets a range of high tech scrubbers and nozzles for various industrial air emission applications. It also sells its nozzle systems for a variety of non-scrubber applications. The company has patented niche proprietary technologies (11 U.S. patents, several pending) which provide distinct competitive advantages in performance, efficiency and cost. With continuing research and development, more patents will follow and the company will retain its competitive advantages.

THE CHALLENGE

The state-of-the-art Flue Gas Desulphurization (FGD) technology uses lime or limestone to capture the sulphur dioxide (SO₂), thereby creating calcium sulphite and sulphate waste. Turbotak's FGD technology employs Dow U.S. amines in the sorbent (aqueous) solution which is introduced as a fine spray in-duct in a multi-stage

absorber to achieve both high SO₂ removal and high sorbent (amine) loading. The loaded amine sorbent is readily stripped at 100°C, using steam to provide heat while driving SO₂ in the gaseous phase from the amine solution. Then the free water is removed from the SO₂ by condensation. The wet SO₂ gas stream is dried before recycling to an acid plant or liquified to give a pure liquid SO₂ solution which can be shipped to markets in tank cars. The stripped amine solution is cooled and returned to the absorber circuit.

This process can be employed on any gas stream containing SO₂ and works especially well where SO₂ concentrations are greater than 3,500 parts per million which easily gives fully loaded amine.

TECHNOLOGY DESCRIPTION

Sulphur dioxide laden gas is first routed through a pre-scrubber to quench the gas and remove particulates and acid mists. The clean

gas stream then passes through the Turbotak scrubber (absorber) where it contacts a low flow rate of a finely atomized amine solution, cascaded in series. Then the sulphur dioxide is absorbed into the solution, while clean gas exits the scrubber. The solution is collected and stripped with steam to flash off the SO₂. This stripped solution is then cooled and returned to the scrubber. The steam from the stripper overhead is condensed, leaving behind a pure SO₂ product.

This technology can be applied to any gas stream containing SO₂ where the value of the recovered SO₂ and the absence of a waste stream prove beneficial.

TECHNOLOGY OPPORTUNITIES

Turbotak's initial market research indicates that a substantial market exists for tail-gas scrubbers on acid plants, SO₂ emissions at base metal smelters, pulp and paper mills and numerous chemical plants, for example.

Once the Turbotak process has been commercialized, it could be used in small coal-fired power plants in China. This exposure could lead to larger utility applications in North America at which point Turbotak will seek a partner to promote the technology to large utilities.

The outlook for the future is good because this new technology generates no waste and is cost-competitive to the lime/limestone FGD processes.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The pilot phase of the development of this technology was partially funded by the Ontario Ministry of Environment and Energy. Working relationships with Union Carbide Canada Ltd. and Dow U.S. have also helped to expedite progress on this project to this phase.

Industrial companies located in Ontario may participate in ministry/industry programs which will help them to:

- * reduce, reuse and recycle solid waste;
- * effectively remediate historic pollution and destroy hazardous contaminants;
- * reduce or eliminate liquid effluent and gaseous emissions;
- * use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

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MINISTRY OF ENVIRONMENT AND ENERGY PROGRAMS

For information on Ministry of Environment and Energy assistance to industry, please contact the Industry Conservation Branch at (416) 327-1492, FAX (416) 327-1261

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